

MODIS Team Meeting Minutes

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Sent out 4/7/95 at about 2:15 PM to MODIS.REVIEW

1. Summary

George Daelemans is at SBRC for an extended stay of several weeks for EM thermal vacuum test preparations and testing. He can be reached at (805)562-7251. George will have email shortly.

Thermal vacuum testing of MODIS is currently scheduled to start about April 16. In his April 3 viewgraphs, Tom Koch has identified a few problems which should be taken care of before thermal vacuum testing. A few members of the GSFC MODIS team plan to be at SBRC during portions of the EM thermal vacuum test.

On April 24, Bruce Guenther has indicated there will be an ad-hoc workshop on software corrections for spurious scattering.

The Calibration Discipline Group meeting is on May 2 and the MODIS Science Team meeting is May 3 thru 5.

2. Tom Koch (Systems Integration and Test)

excerpts from Tom's viewgraphs from April 3, 1995:

Ambient tests completed for ambient radiometric performance and spatial performance tests. In-band spectral performance tests in progress. Each first and second shift team is becoming proficient in controlling MODIS commands and operations. MODIS system checkout is progressing.

However, all is not perfect. Involuntary system problems are being encountered. Real-time display operation causes some system crashes. 120 V power supply drops out. Archiver usage overload can lock up entire system. Archiver memory overload impedes data acquisition and reduction. There are involuntary switches from day to night mode and from RAM to ROM mode. The DC restore balance function is intermittent. Several vital telemetry functions are missing. Other telemetry and command functions are non-functional. Most problems are not show stoppers but create major delays to testing continuity. Loss of system power could cause major delays in thermal vacuum.

The calcium fluoride IAC window was received, inspected, and proof tested. The consent to install the CaF2 IAC window in the MODIS Calibration Chamber (MCC) was completed on the first of April and the window was installed. IFOV, MTF, and SBR spatial performance tests are in progress.

During the period from 4/7 to 4/11, the plan is to install SBS's for the radiative cooler, MEM, SAM, and FAM. Blankets will be installed on MODIS and the nadir panel. A trial test of the MCC will be conducted. MODIS will be reinstalled in the MCC and aligned.

Tom Koch's viewgraphs show the EM vacuum timeline with MODIS testing at 305 K and then 285 K during a 24 day time period.

3. Sal Cicchelli (Chemical Cleaning and Lubrication of Space System Mechanical Components for Multi-Year Operations)

The Montreal Protocol prohibits production of CFC-113 (Freon) and TCA after 1995. MODIS does not use any CFC-113. TCA is not being used internally by SBRC or Schaeffer Magnetics. Speed Ring does use TCA.

4. Bob Martineau (Focal Planes)

Email from Bob Martineau on 3/30/95 at 10:58 AM:

- 1) LWIR PF FPA: The LWIR FPA detective assembly SCA testing has been completed. Data reduction is due March 31. SBRC expects data to show acceptable final linearity, NEI, and response dynamic range. LWIR filters are on hold pending major waivers. Filters have transmissions which are too low, and bandwidths and center wavelengths which are out of spec. Delivery of the PF LWIR FPA has slipped from April 24 to April 29. This delivery date depends on getting the LWIR filter assembly by April 14.
- 2) SMWIR PF FPA: The PF SMWIR FPA completed detective assembly tests. Data is under review. The SMWIR filter assembly is also late. Delivery of the PF SMWIR FPA is now expected to be April 21, as opposed to last week's April 7, and depends on receiving the filter assembly by April 7. Both FPA deliveries are on the critical path for Rad-cooler build.
- 3) Progress on LWIR and SMWIR F1 and F2 units continues to be satisfactory. Nine LWIR arrays have completed diamond point turning and will be sent on to hybridization. A non-flight SMWIR SCA will be ready for test in mid-April. Its purpose will be to correlate new wafer detector probe data and SCA test data.
- 4) Two VIS and NIR SCA screen tests have been started for F1 and F2 deliveries. Five VIS and 5 NIR candidate SCAs have partially completed screen tests. SBRC will test 8 of each and review the data for unit selection.
- 5) F1 and F2 motherboard fabrication is completed. F1 and F2 cable assembly builds are in process. The first F1 non-LWIR pedestal/motherboard subassembly is completed.

5. Gerry Godden (ZnSe BRDF and Harvey Shack Numbers)

Breault's BRDF Measurement of ZnSe Witness Sample;

Email from Gerry Godden, 3/30/95, 5:15 PM:

Good news! Maybe.

Breault's BRDF measurement of the ZnSe witness sample at 633 nm turned out much better than SBRC's measurement. Like a factor of 10. This significantly effects the second tall pole in the aft-optics tent.

The Harvey Shack equation was fit to the SBRC BRDF measurement with

$$a = 4.5 \text{ (amplitude)}$$

$$b = -2.0 \text{ (slope)}$$

The Breault measurement was fit with

$$a = 0.2$$

$$b = -1.8$$

Obviously, we would like to believe and use the Breault measurement. There is the possibility that there is some mix up or difference in the sample provided us. I have a call in to Tom Kampe to discuss this. There is the confusion factor that the current optical system drawing we have indicates that E2 is SF11. Breault assures me that the Code V model from SBRC which takes precedence over the optical system drawing calls out ZnSe for E2 for both the VIS and NIR channels. Also, I believe that there is a diamond turned ZnSe witness sample used in one or both of the thermal bands. I am pretty sure that the ZnSe used in the VIS and NIR objectives is polished to figure. I expect that with the Breault measurement we will see E2 in the VIS and NIR fall in to line.

email from Gerry Godden to Tom Kampe, 4/6/95,12:50 PM:

Thanks for the scatter data you sent us. These data raise some questions:

1) Figure 1 of Terry Ferguson's 21 March memo (PL3095-Q04746) indicates a HS (24, -2.535) fit for the 633 nm measurement. Could this Figure be mislabeled? Or are we seeing measurement variability between different regions on the same sample?

When we plotted the data you sent us we got a pretty good fit for your 633 nm data with HS(8.12, -2.25), and for your 442 nm data with HS(25.67,-2.62). If we use the slope to extrapolate the anchor point value from one wavelength to another we get:

442 extrapolated to 633:

$$25.67 / (633/442)\exp(2.62) = 10.02 \text{ vs. } 8.12$$

633 extrapolated to 442:

$$8.12 \times (633/442)\exp(2.25) = 18.22 \text{ vs. } 25.67$$

Moderate agreement between these data sets.

If you concur that the HS(8.12,-2.25) data for 633 nm is valid, then I am inclined to proceed with the APART modeling using this result, or perhaps with a guessed at improved result that you think we might achieve. Jim Young speculated with me that perhaps the scatter performance could be improved a factor of two to three. Thus we might guess that HS(4,-2) is achievable. What do you think?

2) BRO Inc. has completed the 633 nm BTDF measurement of the ZnSe witness sample you sent them. Their results are in moderate agreement with yours. Fitting your data we get HS(4.51,-2.00). The BRO data indicate HS(3.19,-3.00). It surprises me that the slopes are this different. These results are regarded by Bob Breault to be quite high for ZnSe at 633 nm, and the preliminary APART results indicate that E2 in

the NIR channel is a prominent (though less than D1) scatterer. I understand from Danny Milsom that E2 in the VIS channel is not ZnSe. Is this correct?

I am inclined to proceed with the APART modeling using your measured results, or a fit to the average of these two measurements. Do you agree?

6. Eugene Waluschka (Iteration on Design of Solar Diffuser Screen Hole Pattern)

In a memo dated March 29, 1995, Eugene Waluschka has updated his design to correct a few errors. Locations and orientations for the attenuation screen, diffuser, and scan mirror are now correct. Gene would appreciate an independent check.

Gene's suggested design has about two thousand 2 mm diameter holes arranged in a regular pattern. The basic pattern is a triangle with a hole at each vertex. The distance between hole centers is about 6 mm. Over the range of solar angles, these holes were projected onto the diffuser and then reflected to the scan mirror. On the scan mirror, each hole is now an ellipse and the hole centers are at vertices of equilateral triangles about 8 mm on a side.

7. Dr. Charles He: Unisys (Crazing of Unsealed Anodized Black Coatings)

Excerpts from Memo from Dr. Charles He to Jack Ellis dated March 31, 1995:

- 1) Elimination of the hot-water sealing process improves the resistance of the anodized black coatings to cracking. Unisys personnel concluded that hot water sealing is a major reason for the cracking because it produces thermal shock and seals water in the coating which evaporates in vacuum and causes/enhances cracking.
- 2) Unsealed clear coatings showed no cracking after thermal cycling.
- 3) MODIS uses black coatings and this work investigated the effect of thermal cycling on unsealed black coatings. The unsealed black coating still show several large cracks after thermal cycling in thermal vacuum. The large cracks likely would not shed particles during the mission. However, a more dense, fine crack network could form due to larger temperature differences or more cycles and cause contamination problems.

Also, if the black coating is not sealed, the black dye will bleed out in the presence of moisture. The coating must be polished to get a high specularity. If a coolant or lubricant is used for this process, the dye will bleed out during this polishing process. However, the coating must be dyed immediately after anodizing or it could become partially sealed by the moisture in the air.

Another solution is to apply black paint to the unsealed clear coating. SBRC is trying to put CTL 15 black paint on Type III anodize coatings.

8. Bruce Guenther (MCST Weekly)

Excerpts from Bruce's April 6, 9:14 PM email report:

This week the MODIS Characterization Support Team conducted a Program Review of our approach to the Level 1B Data Product to a Panel comprised of our Laboratory Assistant Chief, Locke Stuart, Associate Chief, John Bosworth, the MODIS Instrument Systems Manager, Dick Weber and the MODIS Sensor Scientist, Bill Barnes. The primary concern identified by us at this Review was the maturity of our Flight Operations Requirements Definition (FORD). Since that meeting, we have met with the EOS

AM Project to request further definition of our work in this area, and have approached the Chief of the Mission Operations Division in the Goddard Mission Operations and Data Systems Directorate to discuss the possible loan of one of their experts for assistance in this area.

The Review Panel requested that MCST convene a small Workshop of experts on satellite data image correction to help us establish the feasibility of such work.

The near-field scattering modeling at Breault Research continues on hold while we determine the correct measurements or estimates for surface quality of MODIS optics to use in the Breault analysis.

The ATBD '94 was delivered to me today. We will provide a paper copy to the MODIS Science Team Leader tomorrow, and will give Doug Bennett a copy of the electronic file for inclusion on the EOS WWW Homepage with the other MODIS ATBDs.

Mike Roberto

April 7, 1995